Appendix E

Glossary, Abbreviations, and Acronyms

AAS: American Astronomical Society.
accretion: A process in which a star or planet gathers material to itself by gravitational attraction.
airglow: A quasi-steady radiant emission from the upper atmosphere over middle and low latitude.
albedo: The fraction of incident light reflected by a body.
Alfvén conductance: The conductance of a plasma particularly in the presence of a magnetic field.
Alfvén waves: Hydromagnetic shear waves that move along magnetic-field lines; a major acceleration mechanism of charged particles in plasma physics and astrophysics.
alkane: A member of a series of saturated aliphatic hydrocarbons having the empirical formula C_nH_{2n+2}, where *n* is a positive integer.
aluminosilicate: A colorless, crystalline combination of silicate and aluminate in the form of rhombic crystals.
amino acid: Any of the organic compounds that contain one or more basic amino groups and one or more acidic carboxyl groups and that are polymerized to form peptides and proteins.
andesite: Finely crystalline volcanic rock composed largely of the minerals plagioclase, feldspar, and pyroxene.
AO: Adaptive optics.
APL: Applied Physics Laboratory (Johns Hopkins University).
apoapse: The point in an orbit most distant from the center of attraction.
aromatic compounds: Those compounds that have physical and chemical properties resembling benzene.
AR-SR: Asteroid Rendezvous-Sample Return (mission).
ASI: Agenzia Spaziale Italiana, the Italian national space agency.
astronomical perturbations: Small deviations in the motion of an object caused by changes in the gravitational field or other forces acting on it.
AU: Astronomical unit—the mean distance from Earth to the Sun.

basalt: A volcanic rock composed largely of plagioclase, feldspar, and dark minerals such as pyroxene and olivine.
biosphere: The life zone of Earth, including the lower part of the atmosphere, the hydrosphere, soil, and the lithosphere to a depth of 2 kilometers.
breccia: Rock composed of broken fragments cemented together.

CAPTEM: Curation and Analysis Planning Team for Extraterrestrial Materials.
carbonaceous chondrite: A chondritic meteorite that contains a relatively large amount of carbon and has a resulting dark color.
Cassini: A very large Saturn orbiter launched by NASA in October 1997. Several months after its arrival at Saturn in July 2004, it will deploy the European Space Agency's Huygens Titan probe. It will also conduct complex, multidisciplinary observations of the planet's atmosphere, rings, magnetosphere, and satellites. Cassini conducted coordinated observations of Jupiter with Galileo in late 2000.
CasX: Cassini Extended mission.
CCSR: Comet Cryogenic Sample Return (mission).
Centaur: A family of small solar system bodies found between the orbits of Jupiter and Neptune, having appearances ranging from asteroidal to cometlike. Their orbital characteristics indicate that they have not resided in their present locations very long, leading to the suggestion that they are recently migrated Kuiper Belt objects.
Chassignite: A meteorite composed chiefly of olivine thought to come from Mars.
CHEX: The National Research Council's Committee on Human Exploration.
chirality: The right- or left-handedness of an asymmetric molecule. Absence of symmetry on reflection.
chondrite: A stony meteorite containing chondrules.
chondrule: A roughly spherical body consisting chiefly of pyroxene or olivine minerals embedded in the matrix of certain stony meteorites.
clathrate: A compound in which one component is enclosed by the structure of another.
clinopyroxene: The general term for any of the pyroxenes that crystallize in the monoclinic system.
CNES: Centre National d'Etudes Spatiales, the French national space agency.
CNSR: Comet Nucleus Sample Return.
COEL: The National Research Council's Committee on the Origins and Evolution of Life.
coma: The spherical envelope of gas and dust surrounding the nucleus of an active comet, created when the ambient heat causes the vaporization of cometary material.
comet: A volatile-rich body that develops a transient atmosphere, or coma, as it approaches the Sun. Most observed comets have highly elliptical orbits, sometimes approaching parabolic.
COMPLEX: The National Research Council's Committee on Planetary and Lunar Exploration.
Contour: The Comet Nucleus Tour mission.
corotation resonance: A periodic enforcement of perturbations at the frequency of the orbital motion.
cosmochemistry: The branch of science concerned with the chemical composition of the universe and its origin.
CSSR: Comet Surface Sample Return (mission).

DAP: Data-analysis program.
diapir: A dome or anticlinal fold in which a mobile plastic core has ruptured the more brittle overlying rock.
differentiation: The process by which the interior of a planetary body separates into layers of different compositions.
diking: The process by which a tabular body of rock cuts across the structure of adjacent rocks.
DPS/AAS: Division for Planetary Sciences of the American Astronomical Society.
DSN: Deep Space Network.
dunite: An ultrabasic rock consisting almost solely of a magnesium-rich olivine with some chromite and picotite.
dynamo: An electromagnetic process in which the movement of conductive material gives rise to a magnetic field.

ecliptic: The plane of Earth's orbit around the Sun.
EGE: Europa Geophysical Explorer (mission).
ELAN: Europa Lander (mission).
electron dissociation: The process by which molecules are broken apart through collisions with electrons.
electron spectrometer: A device that measures the distribution of energy in a flux of electrons.
ELV: Expendable launch vehicle.
emission spectrometer: A device that measures the energy emitted by materials due to their intrinsic heat.

endogenous, endogenic: Relating to a processe of internal origin.
eolian: Pertaining to the action or effect of the wind.
E/PO: Education and public outreach.
ESA: European Space Agency.
EUV: Extreme ultraviolet.
exogenous, exogenic: Relating to a process of external origin.
extremophiles: Microorganisms capable of growing under extreme physiochemical conditions, such as high temperatures, pressures, and acidity.
extrusion: Emission of magma or magmatic materials at the surface of a planet.

Fabry-Perot interferometer: A device having two parallel glass plates, silvered on their inner surfaces so that an incoming electromagnetic wave is multiply reflected between them to cause self-interference and then is transmitted.
fluvial: Pertaining to or produced by the action of a river or stream.
FY: Fiscal year.

Galilean satellites: The four largest moons of Jupiter—Io, Europa, Ganymede, and Callisto—first observed by Galileo in 1610.
Galileo: A large Jupiter orbiter launched by NASA in 1989. Following arrival at Jupiter in 1995, it deployed an atmospheric entry probe and subsequently has conducted complex, multidisciplinary observations of the planet's atmosphere, rings, magnetosphere, and satellites. Galileo conducted coordinated observations with Cassini during the latter's Jupiter flyby in late 2000.
geomorphology: The study of the origin of geologic landforms.
geotechnics: Application of scientific and engineering principles to problems by using knowledge of the properties of crustal materials.
Giotto: The European Space Agency launched this spacecraft in July 1985 on a trajectory that enabled it to perform a fast flyby of the nucleus of Halley's Comet in March 1986. Although severly damaged during the encounter, the spacecraft was later reactivated and performed a close flyby of Comet Grigg-Skjellerup in July 1992.
GO: Ganymede Orbiter (mission).
graben: A block of the crust, generally with a length much greater than its width, that has dropped relative to blocks on either side.
GSMT: Giant Segmented Mirror Telescope.

habitable zone: The notional region around a star within which an Earth-like planet would experience environmental conditions compatible with life as we know it. The solar system's habitable zone stretches, approximately, from the orbit of Venus to the orbit of Mars.
heteropolymer: A polymer that consists of a series of two or more different monomers.
HST: Hubble Space Telescope.
Huygens: The European Space Agency's contribution to NASA's Cassini mission. Huygens will be released from Cassini in late 2004 and will conduct in situ observations of Titan's atmosphere and surface.
hydrosphere: All bodies of water on a planet, as distinguished from the lithosphere and the atmosphere.

IDPs: Interplanetary dust particles—tiny particles that once orbited in the space between the planets, normally collected in the stratosphere by high-flying aircraft.
igneous cumulates: Accumulations of igneous rocks.
impact gardening: The process of mixing surface materials by impact.
IO: Io Orbiter (mission).
IRTF: NASA's Infrared Telescope Facility.
ISAS: Institute of Space and Astronautical Science, Japan's space science agency.

ISO: Infrared Space Observatory.
isotopic fractionation: The process by which the isotopic composition of a substance is changed over time due to physical and chemical processes.
ISS: International Space Station.

Joule heat: The heat generated when an electrical current flows through a medium having electrical resistance.
JPL: Jet Propulsion Laboratory.
JPOP: Jupiter Polar Orbiter with Probes (mission).
JWST: James Webb Space Telescope.

KBO: Kuiper Belt object—a general name for the bodies found in the Kuiper Belt.
KBP: Kuiper Belt-Pluto (Explorer mission).
komatiite: Mantle-derived igneous rock with a content high in magnesium.
Kuiper Belt: A region of the solar system containing icy planetesimals distributed in a roughly circular disk some 40 to 100 AU from the Sun. Pluto is believed to circumscribe the innermost region of the Kuiper Belt.

Langmuir probe: A device for measuring the temperature and electron density of a plasma.
LDEF: Long Duration Exposure Facility.
lherzolites: Peridotite composed principally of olivine.
LIBS: Laser Induced Breakdown Spectroscopy.
Lindblad resonance: A celestrial-mechanics phenomenon occurring when an orbiting object encounters periodic crests of a gravitational potential at the same frequency as its radial oscillations.
lineament: A straight or gently curved, lengthy topographic feature.
lithosphere: The rigid outer crust of rock of a planetary body.
littoral drift: Materials moved by waves and currents of the littoral zone.
LSAPT: Lunar Sample Analysis Planning Team.
LSST: Large Synoptic Survey Telescope.
Luna: A series of some 24 spacecraft launched to the Moon by the former Soviet Union between 1959 and 1976. The series included three successful sample-return missions (Lunas 16, 20, and 24) and the deployment of two Lunokhod rovers (Lunas 17 and 21).

Magellan: A NASA spacecraft launched in May 1989. In the period August 1990 to October 1994, the spacecraft conducted orbital observations of Venus, including the complete radar mapping of the planet's cloud-shrouded surface.
magnetic dipole moment: A property of the magnetic field induced by a current loop.
magnetosphere: The region exterior to a planet in which its magnetic field plays the dominant part in controlling the physical processes that take place there.
MAO: Mars Upper Atmosphere Orbiter (mission).
Mariner: A series of 11 planetary spacecraft launched by NASA in the period from 1962 to 1973. The series included successful flyby missions to Venus (Mariner 2, 5, and 10), Mars (Mariners 4, 6, and 7) and Mercury (Mariner 10), and the first Mars orbiter (Mariner 9).
MEP: Mars Exploration Program.
MEPAG: NASA's Mars Exploration Payload Assessment Group.
MeSR: Mercury Sample-Return (mission).
MGS: Mars Global Surveyor.
microwave radiometer: A receiver for detecting microwave thermal radiation.
ML^{3}N: Mars Long-Lived Lander Network (mission).
MOLA: Mars Orbiter Laser Altimeter.
morphology: The field that deals with the structure and form of an object at any stage in its evolution.
MQF: Mars Quarantine Facility.

MRO: Mars Reconnaissance Orbiter.
MSL: Mars Science Laboratory (mission).
MSR: Mars Sample Return (mission).
mucilage: An organic material that has gluelike properties.
MUSES-C: A Japanese science and technology-development mission designed to rendezvous with an asteroid, collect samples of its surface material, and return them to Earth for study.
MWG: Meteorite Working Group.

nakhlite: A meteorite composed of an aggregate of diopside and olivine thought to come from Mars.
NAS: National Academy of Sciences.
NASA: National Aeronautics and Space Administration.
NASDA: National Space Development Agency of Japan.
NEAR: Near-Earth Asteroid Rendezvous (mission).
NEO: Near-Earth object.
NEP: Nuclear-electric propulsion—a reaction drive that utilizes a fission reactor to power an ion engine.
neutral mass spectrometer: A device that measures the distribution of atomic and molecular masses in a beam of neutral particles.
NGLT: Next Generation Lowell Telescope.
Noachian era: The earliest recognizable epoch in martian geologic history. It is characterized by a heavy cratering rate and the earliest preserved rocks.
NOP: Neptune Orbiter with Probes (mission).
NOTE: Neptune Orbiter/Triton Explorer (mission).
NRC: National Research Council.
NSF: National Science Foundation.
NVO: National Virtual Observatory.

obliquity: The angle between the orbital plane of an object and the plane of its rotational equator.
occultation: The disappearance of the light of a celestial body owing to the intervention of another body of larger apparent size across the line of sight.
OES: NASA's Office of Earth Science.
OM: Organic matter.
OMB: Office of Management and Budget—part of the Executive Office of the President.
Oort cloud: A spherical distribution of comets having semimajor axes between 1,000 and 50,000 AU, typically with low orbital eccentricity.
orthopyroxene: A series of pyroxene minerals crystallizing in the orthorhombic system.
OSF: NASA's Office of Space Flight.
OSS: NASA's Office of Space Science.
outgassing: The emanation of gases from within an object.

PDS: Planetary Data System.
periapse: The point in a orbit closest to the center of attraction.
perihelion: The point at which a body's orbital motion takes it closest to the Sun.
photochemistry: The study of the effects of light on chemical reactions.
photometry: Measurement of light intensities.
phylogenetic: Pertaining to the relationship between different organisms. Such relationships are typically based on comparisons between the genetic characteristics of different organisms.
PI: Principal investigator.
Pioneer: A series of 13 NASA spacecraft launched between 1958 and 1978. The series included the first missions to Jupiter (Pioneer 10 and 11) and Saturn (Pioneer 11) and culminated with two missions to Venus (Pioneer Venus 1 and 2).

planetesimals: The planetary bodies that formed the building blocks of all the solar system's planets and satellites.
plasma wave: A disturbance of a plasma involving oscillation of its constituent particles and of an electromagnetic field, which propagates from one point in the plasma to another without net motion of the plasma.
pyroxene: A ferromagnesium rock-forming mineral having infinite (Si_20_6) single inosilicate chains as its principal motif.

R&A: Research and analysis.
racemic mixture: A mixture with equal quantities of crystals of pure dextrorotatory and levorotatory isomers, making it optically inactive.
radiogenic: Relating to the decay of radioactive isotopes.
radioisotope: A radioactive isotope.
radiometric age: The age of an object as determined by measurement of its radioactive isotopes and their stable end-products.
reflectance spectroscopy: Measurement of the spectral radiant flux reflected from a surface.
regolith: The layer of fragmented, incoherent rocky debris on the surface of a planetary body.
retarding potential: An electric potential that causes the speed of a charged particle to be reduced.
Roche zone: The region about a planet where tidal forces are sufficiently strong to tear apart an idealized fluid body.
Rosetta: A large European Space Agency mission originally scheduled for launch in 2003 and designed to rendezvous with and conduct extended studies of comet 46 P/Wirtanen in 2011. Problems with its launch vehicle have delayed the launch until 2004 at the earliest. Its target comet is currently under review.
RPS: Radioisotope power system.
RTG: Radioisotope thermoelectric generator.

SBN: Small Bodies Node (of the Planetary Data System).
scarp: A cliff or steep slope of some extent, generally separating two level or gently sloping areas.
SDT: Science definition team.
shergottite: A type of meteorite with a basaltic composition consisting chiefly of pigeonite and maskelynite that is thought to come from Mars.
SIM: Space Interferometry Mission.
sinter: To coalesce into a single mass by application of pressure or heat, but without melting.
SIRTF: Space Infrared Telescope Facility.
SKA: Square-Kilometer Array.
SNC: A group of meteorite types thought to have originated on Mars.
SOFIA: Stratospheric Observatory for Infrared Astronomy.
solar-electric propulsion: Reaction system that utilizes solar energy to power an ion engine.
solar nebula: The cloud of gas and dust from which our Sun, the planets, and other bodies in the solar system formed.
space weathering: Alteration of an atmosphereless planetary body's (e.g., an asteroid's) surface materials by exposure to the space environment.
SPA-SR: South Pole-Aitken Basin Sample-Return mission.
SR&T: Supporting Research and Technology.
SSB: The National Research Council's Space Studies Board.
SSE Survey: Solar System Exploration Survey.
stochastic: Random.
stratigraphy: The study of the relationships between stratified rocks.
stratosphere: The region above the troposphere, where a planet's atmosphere becomes stably stratified as a result of solar heating.
stromatolite: A multilayered structure in calcareous rocks that are believed to be of algal origin.
STScI: Space Telescope Science Institute.

supercritical fluid: A fluid at a temperature and pressure above its critical point exhibiting the characteristics of both a liquid and a gas.
SWAS: Submillimeter Wave Astronomy Satellite.

TEX: Titan Explorer (mission).
TGN: Terrestrial Planet Geophysical Network (mission).
thermosphere: The uppermost region of a planet's atmosphere, where the temperature increases with height as a result of strong heating from above and where molecular diffusion of heat plays a major role in vertical heat transport.
tholin: The reddish, tarlike organic residue created in simulations of the action of ultraviolet radiation on gases typically found in planetary environments.
tidal heating: The internal heating of a planetary body owing to friction caused by the differential gravitational effect of an external body on the mass in question.
TPF: Terrestrial Planet Finder (mission).
TRF: Trojan/Centaur Reconnaissance Flyby (mission).
Trojan: A clustering of asteroids that is found at the gravitational-equilibrium points 60 degrees ahead of and behind Jupiter in its orbit about the Sun.
tropopause: The boundary between the troposphere and stratosphere, often characterized by an abrupt change in the rate at which the temperature varies as a function of height.
troposphere: The lowermost portion of a planet's atmosphere, in which temperature decreases with height and thermal convection takes place.
T Tauri: A type of irregular variable star whose spectrum shows broad and very intense emission lines; these are believed to be young stars that have not yet reached the main sequence. The Sun is believed to have exhibited T Tauri characteristics early in its history.
T Tauri phase: An early phase in the evolution solar-type stars characterized by extreme variability and mass loss.

ultramafic: Igneous rock composed principally of mafic (magnesium and iron) minerals, such as olivine and pyroxene.
ultraviolet spectrometer: A device that produces a spectrum of ultraviolet light.
UOP: Uranus Orbiter with Probe (mission).

Venera: A very successful series of some 16 flyby, orbiter, and lander missions to Venus launched by the former Soviet Union in the 1961-1983 period.
Viking: A pair of orbiters and landers launched by NASA to explore Mars in August and September 1975. Viking 1 and 2 orbiters functioned in orbit about Mars until July 1978 and August 1980, respectively. The Viking 1 and 2 landers operated on the martian surface from July and September 1976 until November 1982 and April 1980, respectively.
VISE: Venus In Situ Explorer (mission).
vitric: Referring to a pyroclastic material that is characteristically glassy (contains more than 75 percent glass).
volatile: Elements that condense from or exist as a gas at low temperatures.
Voyager: A pair of deep-space missions launched by NASA to the outer solar system in 1977. Between them, these spacecraft conducted close-up observations of Jupiter (1979), Saturn (1980 and 1981), Uranus (1986), and Neptune (1989).
VSR: Venus Sample-Return (mission).

Z-axis accelerometer: A device that measures the rate of acceleration along a particular direction.
zodiacal cloud: A lenticular-shaped dust cloud surrounding the Sun and maintained by fine material from asteroidal collisions and cometary activity.

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NOTE: Listed according to year of approval for release.